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10/591,475	09/01/2006	Mitsuo Takashima	295882US0X PCT	1462

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EXAMINER	
SHEVIN, MARK L	
ART UNIT	**PAPER NUMBER**
1793	

NOTIFICATION DATE	DELIVERY MODE
06/16/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/591,475	TAKASHIMA ET AL.	
	Examiner	Art Unit	
	MARK L. SHEVIN	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 March 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1-18, filed March 10th, 2009, are currently under examination. Compared to claims 1-18 filed September 2nd, 2008 and examined in the previous Office Action mailed December 12th, 2008, claims 1, 2, 12, 14, 15, and 16 have been amended.

Claim Rejections - 35 USC § 103

2. **Claims 1-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Ibaraki** (JP 2000-337333 – Full human translation) in view of **Koike** (US 2002/0179207).

Ibaraki:

Ibaraki, drawn to a high-strength bolt with excellent delayed fracture resistance and a tensile strength of over 1200 N/mm^2 (Abstract), teaches such a bolt as having proeutectoid ferrite, free cementite, bainite, and martensite phase fractions controlled to under 20% with a remainder of pearlite (Abstract and para 0007).

Ibaraki teaches that it is necessary to control the generation of proeuctectoid ferrite, free cementite, bainite, and martensite as much as possible, especially below 20% and to make pearlite greater than 80% (para 0012).

The alloying additions and their differences between the prior art and the instant claims are presented in the table below:

Elements	Ibaraki	Instant Claim 1	Overlap
C	0.5 - 1	0.5 – 1	0.5 – 1

Si	0 < 2	0.55 – 3	0.55 – 2
Mn	0.2 – 1.0	0.2 – 2	0.2 – 1
P	0 < 0.03	0.0001 – 0.03	0 < 0.03
S	0 < 0.03	0 < 0.03	0 < 0.03
Al	0.01 – 0.05	0 < 0.3	0.01 – 0.05
Cr	0.01 - 0.5	0 < 2.5	0.01 - 0.5
Co	0 < 0.5	0 < 0.5	0 < 0.5
Ni	0 < 1.0	0 < 1.0	0 < 1.0
Cu	0 < 0.5	0 < 1.0	0 < 0.5
Mo, V, Nb, Ti, W	0.01 - 0.5	0 < 0.5	0.01 - 0.5
B	0.0005 – 0.003	0 < 0.003	0.0005 – 0.003

With respect to silicon content, Ibaraki teaches that Si raises the hardenability, deoxidizes the metal, dissolves into ferrite to solid-solution strengthen the steel, and suppresses the deposition of free cementite. The content should be kept below 2.0 wt% to kept the ductility from falling too low for wire drawing (para 0018).

The bolt is formed by wire drawing, cut to length, the head formed by warm forging, and then the threads are cut (para 0007). Strong wire drawing is used because it disperses cementite in the pearlite to impart crack resistance (para 0014). Warm forging is used instead of cold forging because it is more difficult to form the bolt head by cold forging due to the very high strength of the wire rod (para 0039).

Ibaraki does not teach subjecting the bolt to a bluing treatment.

Koike:

Koike, like Ibaraki, is drawn to a high-strength bolt having excellent delayed fracture resistance and stress relaxation resistance with a tensile strength of over 1200 N/mm^2 (Abstract), teaches producing a steel wire of the composition listed in the table below, with a total areal rate of pro-eutectoid ferrite, pro-eutectoid cementite, bainite, and martensite of less than 20% with the remainder as pearlite (para 0008).

Elements	Koike	Ibaraki	Overlap
C	0.5 - 1	0.5 – 1	0.5 – 1
Si	0 < 0.5	0 < 2	0 – 0.5
Mn	0.2 – 1.0	0.2 – 1.0	0.2 – 1.0
P	0 < 0.03	0 < 0.03	0 < 0.03
S	0 < 0.03	0 < 0.03	0 < 0.03
Al	0.01 – 0.05	0.01 – 0.05	0.01 – 0.05
Cr	0 - 0.5	0.01 – 0.5	0.01 - 0.5
Co	0 < 0.5	0 < 0.5	0 < 0.5
Ni	0 < 1.0	0 < 1.0	0 < 1.0
Cu	0 < 0.5	0 < 0.5	0 < 0.5
Mo, V, Nb, Ti, W	0 - 0.3	0.01 – 0.5	0.01 – 0.3
B	Not stated	0 < 0.003	n/a

The steel wire is formed into a bolt by wire-drawing the steel (para 0015), cold heading the wire into a bolt shape (para 0021) and then bluing in the range of 100 – 400

°C to increase the bolt strength and improve the proof stress ratio and relaxation resistance (para 0020).

Koike does not teach the content of silicon in the claimed range of 0.55 – 3 wt% but does teach that the beneficial effects of Si (improving hardenability, deoxidation, and solid-solution strengthening) all improve with increasing Si content, but at the expense of ductility (para 0026). Koike and Ibaraki teach Si as a valuable element in terms of increasing mechanical properties but differ only what they consider as the maximum level acceptable for ductility purposes.

Regarding claim 1, 13, and 15, Ibaraki discloses a high strength bolt with the same strength, a substantially overlapping composition, a substantially similar and specific microstructure, and is produced by a substantially similar method save warm-forging vs. cold-heading and the absence of a final blueing treatment.

Ibaraki teaches that it is “difficult" to cold forge the bolt (para 0039) but does not preclude the process or state that it would not work. In view of the substantial similarities in composition, strength, and final microstructure, one would reasonably expect the two products to possess the same properties.

As the instant claim is written as a product-by-process claim, once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi,* 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

It would have been obvious to one of ordinary skill in high strength steel processing, at the time of the invention, to subject the high strength bolt of Ibaraki to a blueing treatment such as that of Koike as Koike taught that blueing in the range of 100 – 400 °C increases the bolt strength and improves the proof stress ratio and relaxation resistance (para 0020).

Koike teaches the tempering temperature (para 0003 and 0020) to be an art recognized result effective variable effective in increasing bolt strength. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, 205 USPQ 215 (CCPA 1980).

With respect to the amendment to claims 1, 2, 15, and 16 limiting the Cr range to 0.51 to 2.5 wt%, a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). The endpoint of Koike and Ibaraki at 0.5 wt% Cr is are close enough to the lower endpoint of 0.51 wt% Cr of the amended Cr range that one skilled in the art would have expected them to have the same properties. Koike teaches (para 0035) that Cr (along with Co) decreases the content of pro-euctectoid cementite and that the addition of further Cr does not further improve this effective, causing the steels to be expected to have the same properties.

Regarding claims 2-5, 7-8, 10, 12, 14, and 16-18, both Ibaraki and Koike teach steel compositions with alloying additions that fall in the instantly claimed ranges as shown in the tables above. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose the instantly claimed ranges through process optimization, since it has been held that there the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. See In re Boesch, *supra*.

With respect to the amendments to claims 12 and 14, these amendments do not change the scope of the claims as the bolt comprises steel as evident from claim 1.

Regarding claims 6 and 9, Ibaraki teaches limiting the boron content to a maximum of 0.0025 wt% (para 0025) to improve the hardenability of the steel while prevent toughness from degrading and it would have been obvious to incorporate the boron content of Ibaraki in the bolt of Koike for the reasons stated by Ibaraki.

Regarding claim 11, Koike teaches that the balance of the steel composition in the bolt is substantially Fe with inevitable impurities such as O (para 0038). Ibaraki implicitly teaches the balance as Fe and inevitable impurities as the bolt of Ibaraki's invention is made of steel which inherently has Fe as the balance and furthermore unavoidable impurities.

Regarding claim 13, Koike teach the tempering temperature (para 0003 and 0020) to be an art recognized result effective variable effective in increasing bolt strength. It would have been obvious to one of ordinary skill in the art at the time of the

invention to choose the instantly claimed ranges through process optimization; See In re Boesch, *supra*.

Response to Applicant's Arguments:

3. Applicant's arguments filed March 10th, 2009 have been fully considered but they are not persuasive.

Applicants assert (p. 6, para 4 to p. 8) that Ibaraki and Koike teach away from the claimed Cr range and that Koike also teaches away from the claimed Si range.

In response, with respect to the amendment to claims 1, 2, 15, and 16 limiting the Cr range to 0.51 to 2.5 wt%, a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). The endpoint of Koike and Ibaraki at 0.5 wt% Cr is are close enough to the lower endpoint of 0.51 wt% Cr of the amended Cr range that one skilled in the art would have expected them to have the same properties. Koike teaches (para 0035) that Cr (along with Co) decreases the content of pro-euctectoid cementite and that the addition of further Cr does not further improve this effective, causing the steels to be expected to have the same properties.

Although Koike teaches a range of Si outside of the claimed range, where the teachings of two or more prior art references conflict, the examiner must weigh the power of each reference to suggest solutions to one of ordinary skill in the art,

considering the degree to which one reference might accurately discredit another. *In re Young*, 927 F.2d 588, 18 USPQ2d 1089 (Fed. Cir. 1991).

In this case, Koike does not teach the content of silicon in the claimed range of 0.55 – 3 wt% but does teach that the beneficial effects of Si (improving hardenability, deoxidation, and solid-solution strengthening) all improve with increasing Si content, but at the expense of ductility (para 0026). Koike and Ibaraki teach Si as a valuable element in terms of increasing mechanical properties but differ only what they consider as the maximum level acceptable for ductility purposes. Ibaraki teaches that Si raises the hardenability, deoxidizes the metal, dissolves into ferrite to solid-solution strengthen the steel, and suppresses the deposition of free cementite. The content should be kept below 2.0 wt% to kept the ductility from falling too low for wire drawing (para 0018).

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

-- Claims 1-18 are finally rejected
-- No claims are allowed

The rejections above rely on the references for all the teachings expressed in the texts of the references and/or one of ordinary skill in the metallurgical art would have reasonably understood or implied from the texts of the references. To emphasize certain aspects of the prior art, only specific portions of the texts have been pointed out. Each reference as a whole should be reviewed in responding to the rejection, since other sections of the same reference and/or various combinations of the cited references may be relied on in future rejections in view of amendments.

All recited limitations in the instant claims have been met by the rejections as set forth above. Applicant is reminded that when amendment and/or revision is required, applicant should therefore specifically point out the support for any amendments made to the disclosure. See 37 C.F.R. § 1.121; 37 C.F.R. Part §41.37 (c)(1)(v); MPEP §714.02; and MPEP §2411.01(B).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shevin whose telephone number is (571) 270-3588 and fax number is (571) 270-4588. The examiner can normally be reached on Monday - Friday, 8:30 AM - 5:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy M. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Mark L. Shevin/
Examiner, Art Unit 1793

June 6th, 2009
10-591,475

/George Wyszomierski/
Primary Examiner
Art Unit 1793